

Macoun, Cat. Can. Pl. i. 294 (1884); Eastwood, Bot. Gaz. xxxiii. 209 (1902); Farr. Contrib. Bot. Lab. Univ. Pa. iii. No. 1, 61 (1907). *Mairania alpina* (red-fruited form) Britton & Rydberg, Bull. N. Y. Bot. Gard. ii. 179 (1901); S. Brown, Alp. Fl. Can. Rocky Mts., 214 (1907). *Arctous alpinus* [a], var. *ruber* [ra] Rehder & Wilson, Pl. Wils. pt. iii. 556 (1913).—Calcareous soils, Siberia and western China; in North America known from Alaska, Yukon, British Columbia, Alberta, Keewatin, and Quebec (Anticosti Island). For citation of stations see pages 21, 22, 24 and 25.

GRAY HERBARIUM.

SYSTEMATIC STUDIES ON OENOTHERA,—IV. OE. FRANCISCANA AND OE. VENUSTA, SPP. NOVV.

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(Plates 107 and 108.)

THE allies of *Oenothera Hookeri* form an especially difficult group from a systematic standpoint. In as much as they are open-pollinated forms and range throughout most of the far West from Oregon and Washington to Mexico, the chances are great that numerous spontaneous hybrids exist. Although the writer has had a number of forms related to *Oe. Hookeri* in cultivation during the last three years, it has been very difficult to arrive at any conclusion in regard to specific lines in the group. Aside from the more narrow-leaved forms one of which probably represents the true *Oe. Hookeri* T. & G., the cultures have included two very satisfactorily distinct new species, which can be safely characterized at this time. One of them, *Oe. franciscana*, has been cultivated by the writer through three generations. The seeds were taken from a packet accompanying a herbarium specimen which was collected July 30, 1905, at Carmel Beach, Monterey County, California, by Prof. C. P. Smith, of the Maryland Agricultural College, (C. P. Smith 1063, in herb. Bartlett.) They were planted in the open in the spring of 1910. Since the species is rather persistently biennial unless the seeds are started during the winter in the greenhouse, the plants failed to mature during the first season. One plant, however, bore in the axil of a rosette leaf, a single precocious flowering branch

from which seeds were obtained for a small culture (10 plants) which was started early enough so that it flowered normally during the summer of 1911. The culture of 1910, from the wild seeds, also flowered in 1911 and was identical with the F_1 generation. The same plant, which had flowered precociously in 1910, flowered again in 1911, and was self-pollinated. From the self-pollinated seeds of this plant a second F_1 of ten plants was grown in 1912. One of them, No. 6₁₀-6₁₂ in the writer's garden at Bethesda, Maryland, served as one parent of reciprocal crosses of which the other parent was a plant of true *Oe. biennis* L. in the garden of Prof. B. M. Davis at the University of Pennsylvania. The same parent plant, which was used for the crosses, was self-pollinated to continue the pure strain. In 1913, fifty plants were brought to maturity in the garden of the Bureau of Plant Industry at Glenn Dale, Maryland, and Davis grew the hybrids with *Oe. biennis*, as well as a considerable number of plants of the pure strain, at Philadelphia. Prof. Davis also had a culture of *Oe. franciscana* from wild seed collected by Miss Alice Eastwood in San Mateo County. Since all the cultures, from both sources, have been reasonably uniform, there is no reason to doubt that the species is a relatively stable type with a geographic range of considerable extent. The species has received its name from the fact that the material thus far seen has come from central California, the area covered by Greene's *Flora Franciscana*.

The name *Oenothera venusta* is proposed for a species from the more southern part of California. Two varieties of it have been cultivated, differing from each other by the absence in one of a hair type which occurs in the other. It is obviously impossible to affirm that either variety is the parent form from which the other has been derived. In this case, however, and whenever a similar situation arises in the future, the writer will proceed on the hypothesis that the variety in which a character is absent is the derivative form, and the specific diagnosis will be drawn up to cover only the hypothetically older form. The varietal descriptions need then cover contrasting characters only. If a true specific diagnosis were drawn up to include all the varieties of the species, it would become necessary to define and name separately the "var. *typica*" of each species. Such a course would be logical, but in the present unsettled state of our knowledge of the relationships of the *Oenotheras* it seems undesirable to introduce any names which can be dispensed with. Consequently the diagnosis of the *Oe. venusta*

has been drawn up to cover only one variety; the other is described as *Oe. venusta* var. *grisea*.

The typical form of *Oe. venusta* was grown from seeds collected by S. B. Parish at San Bernardino, California, Sept. 16, 1912. Var. *grisea* was collected by F. M. Reed (No. 358) at Riverside, Cal. The writer's cultures of 30 plants of each were very uniform, and the forms are described after only one generation of cultivation. Cultures of both were also grown during the past summer by Prof. B. M. Davis, at Philadelphia.

Oenothera franciscana sp. nov. Biennis. Rosula matura 4–5 dm. diametro, foliis anguste oblanceolatis, maximis modice bullatis, ca. 25 cm. longis, 3.5–4 cm. latis, utrinque molliter pilis subappressis arcuatis tectis, apice acutis, basi in petiolum attenuatis, margine infra mediam distanter sinuato-dentatis, apicem versus solum denticulatis, denticulis callosis. Planta matura 5–8 dm. alta, deorsum cum ramis 10–15 caule proprio fere aequilongis ex foliorum axillis rosulae prodeuntibus, sursum vel simplex et usque ad inflorescentiae basin solum ramulos brevis rosulatos ferens vel infra inflorescentiam ramosa. Rami infimi saepe ramosi. Caules teretes virides pilis triformibus vestiti; I, pilis 2–3 mm. longis patentibus verrucosis acutis basi rubrotuberculatis; II, aliis similibus sed multo brevioribus absque tuberculis rubris; III, paucissimis laevibus minutis ampuliformibus. Folia lanceolata, majora ca. 15 cm. longa, 3.3 cm. lata, utrinque molliter cum pilis acutis verrucosis pubescentia, brevipetiolata, apice acuta, margine distanter sinuato-denticulata. Inflorescentiae simplices laxae. Bractae persistentes, inferiores foliis valde similes late divergentes vel deflexae, fructibus ascendentibus fere ter longiores; superiores basi obtusae vel rotundatae fructibus vix longiores, extus pilis aliis clavatis laevibus apice rotundatis viscidis, aliis longioribus acutis eis foliorum similibus sed non verrucosis tectae, intus solum his indutae. Hypanthium ca. 45 mm. longum, basi 2.3 mm. crassum, superne modice dilatatum, pilis patentibus longis acutis sublaevibus vel inconspicue verrucosis cum aliis multo brevioribus laevibus clavatis intermixtis tectum. Calycis segmenta 38 mm. longa valde hirsuta, apicibus liberis 3.5 mm. longis terminalibus inter se appressis, ante explicationem gemmam basi 7–8 mm. diametro rubro-tinctam formantia; pilis biformibus, I, multis clavatis laevibus et II, longioribus patentibus acutis laevibus basi rubrotuberculatis. Petala, ca. 36 mm. longa obcordata. Stigmata patentia stamina longe excedentia. Ovarium 11 mm. longum, dense pilosum, pilis aliis ascendentibus longitudine valde variantibus acutis verrucosis, aliis paucissimis minutissimis clavatis. Fructus maturus saepe 4.4 cm. longus sed plerumque multo brevior, quadrangulus prismaticus, 5–5.5 mm. crassus, apicibus valvulorum liberis (capsula dehisceta) erectis, 2.5 mm. longis truncatis. Semina 1–1.5 mm. longa, atrobrunea.—Seed

collected at Carmel Beach, Carmel-by-the-Sea, Monterey Co., California, *Chas. Piper Smith*, No. 1063.

Oenothera venusta sp. nov. Biennis. Rosula matura ca. 60 cm. diametro. Folia maxima 30 cm. longa, 6 cm. lata, modice infra mediam bullata, acuta, sinuato-denticulata, ad basin versus repandodentata. Planta matura 13–15 dm. alta, basi ramis ca. 10 ex rosulae axillis prodeuntibus caule proprio aliquantum inferioribus, infra mediam ramulis brevibus 2–20 cm. longis haud floriferis nec rosulatis praedita; sursum ramos floriferos in spicas laterales inflorescentiae terminalis transgredientes gerens. Caulis teres pallidus purpurascens pilis paucis longis arcuatis basi rubrotuberculatis et aliis longitudine multo variantibus plerumque brevissimis sine tuberculo rubro tectus, omnibus valde verrucosis ad apicem versus angustatis sed apice obtusiusculis. Folia lanceolata vel fere obcuneata ca. 15 cm. longa, prope basin 2 cm. lata, superne gradatim angustata acuminata, vix undulato-denticulata, utrinque velutina et de pubescentiae causa pallide viridia, pilis uniformibus, pluribus brevibus arcuatis acutis inconspicue verrucosis. Inflorescentiae e spica terminali angusta laxa et spicis terminali similibus lateralibus constantes, ante anthesin strobiliformes, aetate bracteis ascendentibus, fructibus fere ad rhachin appressis. Bractee persistentes, inferiores foliis parvioribus omnino similes, superiores sublineares vel subulatae acuminatae ovariiis bis terve longiores, extus pilis clavatis laevibus apice rotundatis viscidis aliisque paucissimis longis acutis, intus solum pilis acutis laevibus non viscidis tectae. Hypanthium 40 mm. longum, basi 2.5 mm. crassum, apicem versus ad crassitudinem 3 mm. dilatatum, pubescentia ex pilis paucis longis curvatis ascendentibus et multis erectis clavatis viscidis constante. Calycis segmenta pallido-viridia, nondum expansa gemmam conicam subquadrangulam 36 mm. longam, basi 8 mm. crassam, cum apicibus liberis 4 mm. longis inter se appressis formantia, pilis bifor-mibus eis hypanthii omnino similibus sed densioribus vestita. Petala obcordata ca. 42 mm. longa. Pistillum staminibus longius. Ovarium 10–11 mm. longum dense pilosa, pilis ascendentibus acutis verrucosis paucis longissimis multis brevissimis, nullis rubrotuberculatis. Fructus maturus conicus, subteres, 4-sulcatus, prope basin 7 mm. crassus, ca. 35 mm. longus, apicibus valvulorum liberis 1 mm. longis, truncatis vel obscure emarginatis. Semina 1.5 mm. longa, brunea.—Seed collected Sept. 16, 1912, by S. B. Parish, at San Bernardino, California.

Oe. venusta var. **grisea** var. nov. a forma typica differt bracteis hypanthio et calycis segmentis griseo-viridibus solum pilis acutis verrucosis tectis. Pili clavati apice rotundati viscidi in tota planta desunt.—Seed collected at Riverside, California. “Plant 358 from F. M. Reed.” (B. M. Davis in lit.)

The interesting character which distinguishes *Oe. venusta* from its var. *grisea*,—the absence of viscid hairs in the latter, is possibly

Mendelian. Early in the morning the unopened flower buds of the two varieties look very unlike. The material (it seems to be a mixture of a sugar and a weak acid) which is excreted by the thin-walled clavate hairs of the typical form will have deliquesced, and each hair of this type is then tipped by a drop of viscid solution, sufficiently concentrated so that it has a decided taste. In this condition the buds are greener than when dry. The buds of var. *grisea*, on the contrary, have no secreting hairs and remain dry and gray. When wet by the dew, the droplets condensed on the pubescence have no taste. On a dry day the gross appearance of the buds of the two varieties is the same but they can be readily distinguished with a hand lens. In general, the viscid character of many *Oenotheras* (*Oe. Lamarckiana*, for example) is due to secretions from the thin-walled clavate hairs of the pubescence. The red (or green) tubercles at the base of some of the sharp thick-walled granulose hairs seem to have no secretory function.

The photographs of *Oe. venusta* var. *grisea* accompanying this article were taken under the writer's supervision in the garden of the Bureau of Plant Industry at Glenn Dale, Md., season of 1913. *Oe. franciscana* is being used for genetic studies and plants of the type strain will eventually be illustrated in that connection.

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EXPLANATION OF PLATES.

Plate 107. *Oe. venusta* var. *grisea*, (above) mature rosette, (below) flowering plant.

Plate 108. *Oe. venusta* var. *grisea*, inflorescence and details.

In each figure the reduction may be calculated from the label, which is 10 cm. long.